CLAIMS

1. A method of producing silicon single crystals which comprises employing, in the step of pulling up a silicon single crystal in the Czochralski method, a cooling rate of not less than 7.3°C/min in the single crystal temperature range of 1200-1050°C.

2. A method of producing silicon single crystals which comprises employing, in the step of pulling up a silicon single crystal in the Czochralski method, a cooling rate of not less than 7.3°C/min in the single crystal temperature range of 1200-1050°C and then a cooling rate of not more than 3.5°C/min in the single crystal temperature range of 1000-700°C.

3. A method of producing silicon single crystals as claimed in Claim 1 or 2, wherein the single crystal has an oxygen concentration of not less than 12×10^{17} atoms/cm^3 (ASTM '79).

4. A method of manufacturing epitaxial wafers which comprises allowing an epitaxial layer to grow on the surface of a silicon wafer sliced from a silicon single crystal produced by the Czochralski method by employing a cooling rate of not less than 7.3°C/min in the single crystal temperature range of 1200-1050°C in the step of pulling up thereof.

5. A method of manufacturing epitaxial wafers which comprises allowing an epitaxial layer to grow on the surface of a silicon wafer sliced from a silicon single crystal produced by the Czochralski method by employing a cooling rate of not less than 7.3°C/min in the single crystal temperature range of 1200-1050°C and then a cooling rate of not more than 3.5°C/min in the single crystal temperature range of 1000-700°C in the step of pulling up thereof.

6. A method of manufacturing epitaxial wafers as claimed in Claim 4 or 5, wherein the silicon wafer sliced out has an oxygen concentration of not less than 12×10^{17} atoms/cm^3 (ASTM '79).

7. A method of producing silicon single crystals which comprises employing, in the step of pulling up a silicon single crystal doped with 1 x 10^{12} atoms/cm^3 to 1 x 10^{14} atoms/cm^3 of nitrogen in the Czochralski method, a cooling rate of not less than 2.7°C/min in the single crystal temperature range of 1150-1020°C.

8. A method of producing silicon single crystals which comprises employing, in the step of pulling up a silicon single crystal doped with 1 x 10^{12} atoms/cm^3 to 1 x 10^{14} atoms/cm^3 of nitrogen in the Czochralski method, a cooling rate of not more than 1.2°C/min in the single crystal temperature range of 1000-850°C.

9. A method of producing silicon single crystals which comprises employing, in the step of pulling up a silicon single crystal doped with 1 x 10^{12} atoms/cm^3 to 1 x 10^{14} atoms/cm^3 of nitrogen in the Czochralski method, a cooling rate of not less than 2.7°C/min in the single crystal temperature range of 1150-1020°C and then a cooling rate of not more than 1.2°C/min in the single crystal temperature range of 1000-850°C.

10. A method of producing silicon single crystals which comprises employing, in the step of pulling up a silicon single crystal doped with 5 x 10^{13} atoms/cm^3 to 1 x 10^{16} atoms/cm^3 of nitrogen in the Czochralski method, a cooling rate of not less than 6.5°C/min in the single crystal temperature range of 1150-800°C.

11. A method of producing silicon single crystals as claimed in any of Claims 7 to 10, wherein the single crystal has an oxygen concentration of not less than 4 x 10^{17} atoms/cm^3 (ASTM '79).

12. A method of manufacturing epitaxial wafers which comprises allowing an epitaxial layer to grow on the surface of a silicon wafer sliced from a silicon single crystal doped with 1 x 10^{12} atoms/cm^3 to 1 x 10^{14} atoms/cm^3 of

nitrogen as produced by the Czochralski method by employing a cooling rate of not less than 2.7°C/min in the single crystal temperature range of 1150-1020°C in the step of pulling up thereof.

13. A method of manufacturing epitaxial wafers which comprises allowing an epitaxial layer to grow on the surface of a silicon wafer sliced from a silicon single crystal doped with 1 x 10^{12} atoms/cm^3 to 1 x 10^{14} atoms/cm^3 of nitrogen as produced by the Czochralski method by employing a cooling rate of not more than 1.2°C/min in the single crystal temperature range of 1000-850°C in the step of pulling up thereof.

14. A method of manufacturing epitaxial wafers which comprises allowing an epitaxial layer to grow on the surface of a silicon wafer sliced from a silicon single crystal doped with 1 x 10^{12} atoms/cm^3 to 1 x 10^{14} atoms/cm^3 of nitrogen as produced by the Czochralski method by employing a cooling rate of not less than 2.7°C/min in the single crystal temperature range of 1150-1020°C and then a cooling rate of not more than 1.2°C/min in the single crystal temperature range of 1000-850°C in the step of pulling up thereof.

15. A method of manufacturing epitaxial wafers which comprises allowing an epitaxial layer to grow on the surface of a silicon wafer sliced from a silicon single crystal doped with 5 x 10^{13} atoms/cm^3 to 1 x 10^{16} atoms/cm^3 as produced by the Czochralski method by employing a cooling rate of not less than 6.5°C/min in the crystal temperature range of 1150-800°C in the step of pulling up thereof.

16. A method of manufacturing epitaxial wafers as claimed in any of Claims 12 to 15, wherein the silicon wafer sliced out has an oxygen concentration of not less than 4 x 10^{17} atoms/cm^3 (ASTM '79).